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RADIOTELEGRAPHY.—*Calculation of antenna capacity.* L. W. AUSTIN, U. S. Naval Radio Research Laboratory.

The theoretical predetermination of antenna capacity has always, until recently, been a matter of great uncertainty. Professor Howe[1] in 1914 published an article in the London Electrician giving methods for the calculation of capacities of elongated flat top antennas composed of parallel wires, and giving tables and curves making it possible easily to determine the capacities of small antennas of this type. In another article he later also gave formulas[2] for umbrella antennas.

In 1915 Doctor L. Cohen published antenna capacity formulas in the Electrical World.[3] Very recently in Circular No. 74, the Bureau of Standards[4] gave formulas for elongated parallel wire antenna capacities which are in very fair agreement with observed values and also with the results of Professor Howe. In all of these formulas, except where the results are given in curves and tables, the calculations are more or less laborious, and, of course, do not apply to antennas of other shapes than those mentioned.

It was discovered empirically during the past year that the capacity of all antennas not too elongated in shape and having

[1] HOWE, G. W. O. London Electrician 73: 829, 859, 906. 1914.
[2] Op. cit. 75: 870. 1915.
[3] COHEN, L. Electrical World 65: 286. 1915.
[4] Bur. Stand. Cir. 74: 239. 1918.

their wires not too widely spaced, can be very approximately represented by the formula

$$c = (4\sqrt{a} + 0.88\ a/h) \times 10^{-5} \qquad (1)$$

where c is the capacity, a the area, and h the mean height in microfarads and meters. For antennas having a length l more than eight times the breadth b, the above formula must be multiplied by an elongation factor, and we have

$$c = (4\sqrt{a} + 0.88\ a/h)\ (1 + 0.015\ l/b) \times 10^{-5} \qquad (2)$$

Equation (1), while derived empirically, is in reality the sum of the usual expressions for the capacity of a disk in space and that for a two plate condenser, disregarding edge effect. These equations can be depended upon to give results correct in general to 10 per cent for the antenna top, to which must be added the capacity of the downleads and that due to metal towers, etc. The poorest agreement is found in the case of umbrella antennas, where the amount of wire is often not sufficient to give full capacity.

The closeness of wire spacing required to give approximately full capacity, differs very much with antennas of different shapes and sizes, the required spacing being closer the smaller the antenna. For long parallel wire antennas, this may be calculated from the Bureau of Standards formula already mentioned. In the case of some of the larger antennas, remarkably few wires are required. For example, on a certain triangular antenna about 300 meters on a side, flat tops composed of five wires about one meter apart, strung around the sides of the triangle gave nearly 90 per cent of the capacity obtained when the whole triangular area was filled in. With parallel wire antennas of medium dimensions, a spacing of one meter will generally insure over 90 per cent of the possible capacity.

Table 1 gives some observed values of capacity for elongated parallel wire antennas, and a comparison of the capacities calculated according to the Bureau of Standards formula and equation (2). The data for calculation are given below table 1.

Table 2 gives observed values of capacity for antennas of various shapes compared with the values calculated according to equation (1).

TABLE 1

Elongated Parallel Wire Antennas—Capacity in Microfarads

Antenna Types	Observed	Leads Est'd	Observed minus leads	Calculated BS formula	Calculated Eq. (2)
1. Marconi "L"	0.060	0.007	0.053	0.0542	0.0545
2. Medium Ship Type	0.0020	0.0006	0.0014	0.00147	0.00151
3. Portable Ship Type	0.00040	0.00006	0.00034	0.000335	0.000350
4. Model Marconi "L"	...	...	0.00028	0.000275	0.000255

Data for Calculation

	Length m	Breadth m	Number of wires n	Diam.[a] mm	Area m^2	Height m	l/b
1.	1830	160	32	10	$29.3 \cdot 10^4$	104	11.4
2.	91.5	9.15	11	3	$8.38 \cdot 10^2$	49	10
3.	25.9	1.52	6	3	39.4	12	17
4.	18.3	0.406	6	2.5	7.43	1.52	45

[a] Approximate wire diameter.

TABLE 2

Various Antenna Shapes—Capacity in Microfarads

Antenna Types	Observed	Leads Est'd	Observed minus leads	Calculated Eq. (1)	Area m^2	Height m
5. Triangle	0.0155	0.003	0.0125	0.0129	$5.98 \cdot 10^4$	170
6. Square	0.0180	0.003	0.0150	0.0136	$6.25 \cdot 10^4$	160
7. Irregular	0.038	0.002	0.0360	0.0378	$26.8 \cdot 10^4$	137
8. Triangle	0.0065	0.001	0.0055	0.0054	$1.156 \cdot 10^4$	91.5
9. Portable Triangle	0.00084	0.00006	0.00078	0.00085	$2.67 \cdot 10^2$	12
10. Model Triangle	.....	.....	0.000075	0.000068	1.457	0.633
11. Model Circular Disk	.....	.....	0.000135	0.000125	3.56	0.635
12. Umbrella	0.016	0.0015	0.0145	0.0147	$7.24 \cdot 10^4$	162
13. Model Circular Disk	.....	.....	0.000053	0.000055	0.933	0.50

The chief uncertainty in the observed values of both tables lies in the estimation of the capacity of the downleads, etc. In the case of the models 4, 10, and 13, this was measured along with that due to the measuring instruments and subtracted from the observed values.

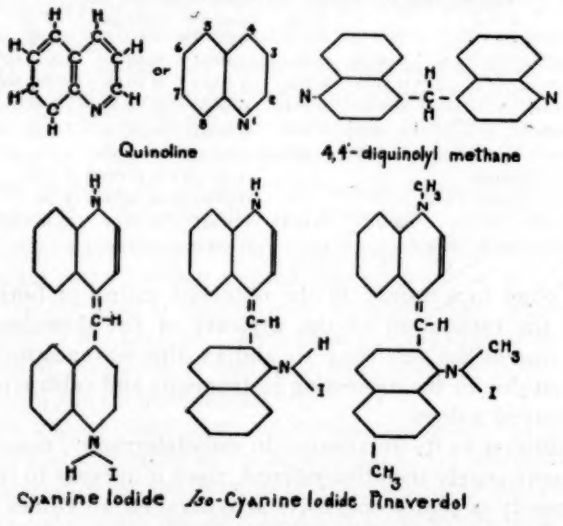
In addition to its importance in radiotelegraphy, equation (1) has a more purely scientific interest, since it appears to represent the capacity of plate condensers in general for all values of plate separation provided one of the plates is grounded. The so-called edge effect is represented by the capacity in space term. The expression if exact for circular plates, should be nearly so for all

not too elongated forms. Experiments are now being carried on to verify these relations and the preliminary results indicate the correctness of the equation for all ratios of R/d. This part of the work will be published separately in the near future.

CRYSTALLOGRAPHY.—*The crystallography and optical properties of the photographic sensitizing dye, pinaverdol.* EDGAR T. WHERRY and ELLIOT Q. ADAMS, Bureau of Chemistry.

CHEMISTRY

Pinaverdol is the trade name of a synthetic dyestuff[1] related to quinoline, and used to sensitize the silver halide[2] of photographic plates to green and yellow light. Its structure is indicated by the name "1,1′,6′-trimethyl-*iso*-cyanine iodide." "Cyanine iodide" is a tautomeric form of the hydriodide of 4,4′-diquinolyl



[1] A full description of the preparation and properties of this substance will appear in the Journal of Industrial and Engineering Chemistry.

[2] "Halide" is a general term comprising chloride, bromide, and iodide, *i. e.*, binary salts derived from any of the halogens.

methane, and the isomeric "*iso*-cyanine iodide" is the corresponding form of the hydriodide of 4,2′-diquinolyl methane—that is, it differs from cyanine iodide in that the second (or primed) quinoline nucleus is attached at the carbon atom adjacent to the nitrogen, instead of at the one diametrically opposite.

Prior to 1914 this dyestuff was made only in Germany, but is now being produced both in England and the United States. The present paper consists of a detailed description of the crystallography and optical properties worked out for the purpose of testing the identity of these several preparations.

CRYSTALLOGRAPHY

The crystals from different preparations of pinaverdol exhibit considerable variation in habit, ranging from markedly prismatic to thinly tabular. Orientation of the different types is made easy, however, by the brilliant and striking reflection-pleochroism present. There are two prominent zones of faces, lying at right angles to one another, and all of the forms in one of them reflect brass-yellow light, while the dominant forms in the other yield beetle-green reflections. The former zone has been taken as the prismatic one, and the latter held right and left. The crystal system then proves to be monoclinic, although since the base lies but 1° 40′ away from the pole of the prism zone, and the plus and minus orthodomes are often about equally developed, it is decidedly close to the rhombic system. According to current usage, it would perhaps be described as "pseudo-rhombic," but it seems to the writers desirable to use prefixes which express more definitely the true relationships.[3] In accordance with the plan we have proposed, pinaverdol would be described as "lepto-monoclinic, but peri-rhombic." It may also be noted that according to Fedorov's usage, since the prism angle is 84° 30′, that is, nearer 90° than 60°, this substance would be classed as hypo-tetragonal or tetragonoidal.

About 20 crystals of all habits were measured on the Gold-

[3] Journ. Wash. Acad. Sci. 9: 153. 1919.

schmidt two-circle goniometer. Some of them proved to be very rich in forms, although the majority of these are extremely minute, and would have been very difficult indeed to locate on any other instrument. The coordinate angles of the 41 forms observed are listed in table 1; not quite all of them were ob-

Fig. 1.

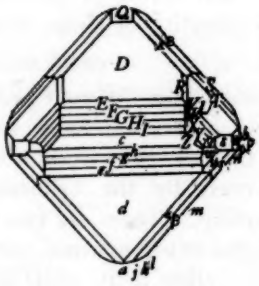


Fig. 2.

Crystals of pinaverdol: Fig. 1 typical habit. Fig. 2 shows all forms observed.

served on any single crystal, but all were obtained on a sufficient number of crystals to regard them as thoroughly established. The probable error of measurement in the case of the larger forms is ± 5′.

Typical combinations of these forms are shown in figures 1–4. Figure 1 represents in orthographic and clinographic projections, or plan and perspective, the typical habit of the bulk of the crystals. The unit prism *m* (110) is the dominant form, with narrow faces of the clinopinacoid *b* (010) in its zone. At rigth angles to this zone lies that of the orthodomes, which are ap-

TABLE 1

Angle Table for Pinaverdol

System monoclinic; lepto-monoclinic, peri-rhombic $a : b : c = 1.1014 : 1 : 1.6053$; $\mu(= 180 - \beta) = 88° 20'$

Number letter	Symbols Gdt.	Symbols Mill	Times noted	Description	Observed ±5′ φ	Observed ±5′ ρ	Calculated φ	Calculated ρ
1 *c*	0	001	8	Narrow, curved	90° 00′	1° 40′	90° 00′	1° 40′
2 *b*	0 ∞	010	30	Narrow	0° 00′	90° 00′	0° 00′	90° 00′
3 *a*	∞ 0	100	12	Very narrow, curved	90° 00′	90° 00′	90° 00′	90° 00′
4 *j*	4 ∞	410	24	Very narrow, curved	75° ..	90° 00′	74° 37′	90° 00′
5 *k*	3 ∞	310	12	Very narrow, curved	70° ..	90° 00′	69° 51′	90° 00′
6 *l*	2 ∞	210	12	Very narrow, curved	61° ..	90° 00′	61° 10′	90° 00′
7 *m*	∞	110	75	Dominant prism form	42° 15′	90° 00′	42° 15′	90° 00′
8 *n*	∞ 2	120	16	Very narrow, curved	24° ..	90° 00′	24° 26′	90° 00′
9 *o*	∞ 3	130	36	Very narrow, curved	17° ..	90° 00′	16° 51′	90° 00′
10 *p*	∞ 4	140	32	Very narrow, curved	12° ..	90° 00′	12° 48′	90° 00′
11 *e*	$0^1/_2$	012	4	Part of curve	2° ..	38° ..	2° 04′	38° 46′
12 *δ*	01	011	12	Small, often curved	1° ..	58° ..	1° 02′	58° 05′
13 *γ*	02	021	6	Part of curve	0° ..	72° ..	0° 31′	72° 42′
14 *d*	10	101	16	Well developed	90° 00′	56° 05′	90° 00′	56° 05′
15 *e*	$^2/_{30}$	203	3	Very narrow, curved	90° 00′	45° ..	90° 00′	45° 02′
16 *f*	$^1/_{30}$	102	6	Very narrow, curved	90° 00′	37° ..	90° 00′	37° 10′
17 *g*	$^1/_{30}$	103	3	Very narrow, curved	90° 00′	27° ..	90° 00′	27° 15′
18 *h*	$^1/_{40}$	104	2	Very narrow, curved	90° 00′	21° ..	90° 00′	21° 29′
19 *I*	$-^1/_{60}$	$\bar{1}06$	5	Part of curve	90° 00′	12° ..	90° 00′	12° 04′
20 *H*	$-^1/_{40}$	$\bar{1}04$	3	Very narrow, curved	90° 00′	19° ..	90° 00′	18° 33′
21 *G*	$-^1/_{30}$	$\bar{1}03$	5	Very narrow, curved	90° 00′	25° ..	90° 00′	24° 33′
22 *F*	$-^1/_{20}$	$\bar{1}02$	3	Very narrow, curved	90° 00′	35° ..	90° 00′	34° 59′
23 *E*	$-^2/_{30}$	$\bar{2}03$	3	Very narrow, curved	90° 00′	43° ..	90° 00′	43° 19′
24 *D*	−10	$\bar{1}01$	18	Dominant dome form	90° 00′	55° 00′	90° 00′	55° 01′
25 *Q*	−20	$\bar{2}01$	2	Part of curve	90° 00′	70° ..	90° 00′	70° 54′
26 *w*	$^1/_2$	112	2	Part of curve	43° ..	48° ..	43° 22′	47° 50′
27 *u*	1	111	8	Part of curve	43° ..	65° ..	42° 49′	65° 26′
28 *s*	2	221	4	Part of curve	43° ..	77° ..	42° 32′	77° 04′
29 *S*	−2	$\bar{2}21$	4	Part of curve	42° ..	77° ..	41° 58′	76° 58′
30 *T*	$-^3/_2$	$\bar{3}32$	8	Part of curve	42° ..	73° ..	41° 52′	72° 49′
31 *U*	−1	$\bar{1}11$	12	Dominant pyramid	41° 45′	65° 05′	41° 41′	65° 03′
32 *V*	$-^2/_3$	$\bar{2}23$	4	Very narrow, curved	41° ..	55° ..	41° 23′	54° 58′
33 *W*	$-^1/_2$	$\bar{1}12$	6	Very narrow, curved	41° ..	47° ..	41° 06′	46° 48′
34 *X*	$-^1/_3$	$\bar{1}13$	6	Very narrow, curved	41° ..	35° ..	40° 29′	35° 08′
35 *Y*	$-^1/_4$	$\bar{1}14$	6	Very narrow, curved	41° ..	28° ..	39° 53′	27° 37′
36 *Z*	$-^1/_6$	$\bar{1}16$	6	Very narrow, curved	40° ..	19° ..	38° 39′	18° 54′
37 *R*	$-1^1/_2$	$\bar{2}12$	4	Very narrow, curved	60° ..	60° ..	60° 41′	58° 37′
38 *α*	21	211	30	Narrow, curved	61° ..	73° ..	61° 25′	73° 24′
39 *β*	32	321	20	Narrow, curved	54° ..	80° ..	53° 54′	79° 38′
40 A	−21	$\bar{2}11$	36	Narrow, but bright	61° ..	73° ..	60° 56′	73° 09′
41 B	−32	$\bar{3}21$	30	Narrow, curved	54° ..	80° ..	53° 32′	79° 31′

proximately equally developed, d (101) and D ($\bar{1}01$). In the zone of these domes there are also narrow faces of the base c (001). Finally, small faces of the minus unit pyramid U ($\bar{1}11$), are usually present.

Using the upper, orthographic projection of fig. 1 as a basis, figure 2 has been drawn to show the positions which are occupied by all of the forms observed. Many of these have had to be made

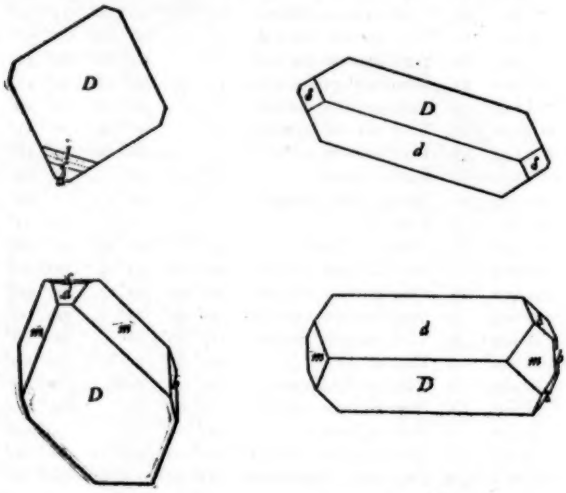


Fig. 3. Fig. 4.

Pinaverdol crystals. Habits shown by material of English and German origin.

relatively much wider than they are in the actual crystals to show them at all. For lettering these forms the plan has been followed of assigning the usual letters, a, b, c, d, and m to the simple forms, and then in any one zone following as far as possible an alphabetical sequence. Thus the several prisms are made successively j, k, l, m, n, o, and p, the plus orthodomes d, e, f, g, and h, the plus unit s, u (111), and w, the plus orthopyramids α and β, and the clinodomes α, δ, and ϵ. The minus forms are then named by capital letters corresponding to the small ones of the plus forms. This gives D, E, F, G, H, and I for the ortho-

domes, *S*, *T*, *U*, *V*, *W*, *X*, *Y*, and *Z*, for the unit pyramids, and A and B, regarded as Greek capitals, for two of the orthopyramids; and finally, two letters left over, *Q* and *R*, are applied to a steep orthodome and the remaining orthopyramid, respectively.

A habit rather frequently assumed, especially by material received from England, is shown in plan and perspective in figure 3. Its peculiar tabular aspect is due to the prominent development of the minus orthodome *D* ($\bar{1}01$). The prism *m* (110) is usually present around the edge of the plates, although these sometimes become so thin that the prism is practically crowded off. The clinopinacoid, *b* (010), is often better developed on crystals of this habit than in those of type 1, and a small plus orthodome, *d* (101), is also usually present as a bounding form. Instead of a plane face where the base, *c* (001), should lie, a curved surface is usually present, which extends from about the position of *c* back as far as that of the minus orthodome *I* ($\bar{1}06$).

Still another distinct habit is illustrated in figure 4. This appears most frequently in a preparation obtained from Germany before the war, which was crystallized from an unknown solvent. In this there is marked elongation along axis *b*, making the crystals pseudo-prismatic on the orthodomes *d* (101) and *D* ($\bar{1}01$). The only other unusual feature shown by these crystals is the rather prominent development of the clinodome δ (011).

COLOR PHENOMENA

As noted in the introductory paragraph under the heading Crystallography, the crystals of pinaverdol exhibit a striking and brilliant reflection pleochroism. This phenomenon being a rather uncommon one, it will now be described in greater detail.

In any biaxial crystal there are three directions at right angles to each other in which properties connected with light are exhibited. In the rhombic system these directions coincide with the crystallographic axes; in the monoclinic, one coincides with axis *b*, while the other two are limited to the plane of symmetry, but do not in general coincide with either of the crystallographic axes lying in that plane. In the present instance, however, the properties of the crystals are peri-rhombic, as we have termed it,

that is, very close to rhombic in character, so marked deviation of the optical directions from axes *a* and *c* is not to be expected. For practical purposes, therefore, the optical phenomena may be considered in the general direction of the three crystallographic axes.

The faces of the clinopinacoid *b* (100) reflect light of brilliant brass-yellow color. Those of the orthopinacoid *a* (100) have not been observed broad enough to determine the color accurately but it does not appear to be materially different from that of *b;* on theoretical grounds, of course, it must be at least slightly different. The prism faces *m* (110), which lie about midway between these two pinacoids, are correspondingly also brass-yellow.

Faces lying perpendicular to axis *c*, or nearly so, show a deep bronze-violet reflection color. Intermediate colors are of course shown by all forms lying between the base and the prism, namely, by the domes and pyramids, and the actual color is a brilliant metallic green, which may perhaps best be described as beetle-green. The nearer one of these forms lies to the base, the darker the green, and the nearer the prism, the more yellow appears in it. In fact, the colors of a form may be correlated directly with the value of its coordinate angle ρ, which represents the angle between the zone axis of the prism and the perpendicular to the face in question. For forms of sufficient size to permit the certain recognition of their color, the relations are as follows :

TABLE 2

Colors of Crystals

Letter symbol	ρ angle	Color
c (001)	1° 40′	Violet
I ($\bar{1}$06)	12° 04′	Violet
ε (012)	38° 46′	Dull brownish green
D ($\bar{1}$01)	55° 01′	Bright green
d (101)	56° 05′	Yellow-green
δ (011)	58° 05′	Yellow-green
U ($\bar{1}$11)	65° 03′	Green-yellow
A ($\bar{2}$11)	73° 09′	Green-yellow
m (110)	90° 00′	Yellow
b (010)	90° 00′	Yellow

It is noteworthy that in every case the pseudo-faces which have developed on pinaverdol crystals through contact with the glass container show similar colors, corresponding to their position. A most striking effect is obtained when a sheet, made up of crystals lying in all sorts of positions, is removed from against a glass surface and examined in reflected light, especially with the aid of a low-power lens. Some of the grains are violet, some yellow, while the bulk of them are of different hues of green, the whole effect being kaleidoscopic in character.

When viewed through a nicol prism two components can be recognized in the light reflected from each face. The brassy prism zone faces yield for the two opposed directions of the vibration plane of the nicol, a yellow (plane parallel to *c*) and a violet (plane parallel to *a*) component; the green dome faces green (parallel to *c*) and violet (*a*); terminal forms show violet, which changes but slightly as the nicol is revolved.

A similar pleochroism of reflected light has been observed in but few substances. The best known case is magnesium platinocyanide, which has been described at length by Walter.[4] A dye known as diamond green or brilliant green, made by the Badische works, was stated by the same author to show it also, although no samples at our disposal do so. The mineral covellite, CuS, gives a metallic blue reflection color on the base, and Merwin[5] states that the color varies noticeably in different crystallographic directions. Goethite, FeOOH or $Fe_2O_3.H_2O$ yields nonmetallic reflection from most of its faces, but one pyramid is reported by Goldschmidt and Parsons[6] as giving a yellow colored signal.

OPTICAL PROPERTIES

Since pinaverdol is readily soluble in organic solvents, it is necessary to use for its study by the immersion method under the microscope aqueous liquids of known refractive indices, and solutions of potassium-mercuric iodide and barium-mercuric

[4] WALTER, B. *Die Oberflächen oder Schillerfarben.* Braunschweig, 1895.
[5] MERWIN, H. E. This JOURNAL **5**: 341. 1915.
[6] GOLDSCHMIDT, VICTOR, and PARSONS, A. L. Amer. Journ. Sci. **29**: 235. 1910.

iodide in diluted glycerol were found to be satisfactory. Crystals greater than 0.02 mm. in diameter are practically opaque for ordinary white light, but by dissolving a little of the substance in hot methyl alcohol and allowing the liquid to cool rapidly, minute needles of satisfactory transparency can be obtained. For red light, which may be obtained by the use of a Wratten E-red No. 23 ray-filter, the transmission of light is much better. The following optical properties could be observed:

In ordinary light: Crystals, rods with oblique or square terminations, breaking into irregular fragments. Color very intense, with pleochroism from violet-brown to brown to deep greenish brown; or, in very thin crystals violet to brown to yellow-brown. By the use of a monochromatic illuminator, the crystals showing violet-brown color were found to transmit the red end of the spectrum from the limit of visibility to the orange of wave length about 600; on decreasing the wave length, marked absorption was exhibited, the crystals being highly opaque for the yellow, green, and part of the blue; but on reaching the middle blue at about wave-length 470 transmission was again noted, and continued to the end of the visible violet. The directions in the crystals giving brown or greenish brown behaved differently, however, the red end of the spectrum being absorbed, while a slight though distinct transmission appeared in the yellow and green, with absorption in the blue and violet.

Refractive indices: There is such a tendency to yield metallic reflections on the part of the pinaverdol crystals that refractive index determinations do not yield very satisfactory results. The lowest index α, which is shown lengthwise of the crystals of the usual prismatic habit, is about 1.58, for light of wave length 625; this is the direction in which the transmission is usually greatest, and the color violet. The other two indices are much greater than 1.75, which is that of the highest liquid which it has been found possible to prepare. They probably reach a value of at least 2.00. The greenish brown and yellowish brown colors correspond to these, the absorption being great in both of them.

In parallel polarized light, nicols crossed: The extinction is

inclined on crystals turned so that axis *b* is more or less vertical, and reaches a maximum of 5° ± 1°. The double refraction is excessively strong, so that no color effects are obtained. The sign of elongation is negative.

In convergent polarized light: Traces of biaxial figures are sometimes seen, but little can be determined about them. The plane of the optic axes runs lengthwise; the sign is clearly negative; and the optical orientation is $X \wedge c = 5°$ in acute angle β, but whether Y or Z = *b* is uncertain.

These properties, with but minor variations, are shown by several different preparations made in this laboratory, by a German product obtained before the war, and by the English "sensitol green." The identity of all of the substances is thus established.

ORNITHOLOGY.—*Grandalidae, a new family of turdine Passeriformes.* HARRY C. OBERHOLSER, Biological Survey.

The genus *Grandala* was based by Hodgson on a unique new species which had been obtained in Nepal and which was named by him *Grandala coelicolor*.[1] This beautiful and otherwise remarkable bird has hitherto been referred to the Turdidae, usually without question. It has commonly been considered most closely allied to *Sialia* Swainson, and, indeed, by Seebohm[2] was even made a subgenus of that group. It was evidently so placed because of its booted tarsi, blue color, and general size, for in no other important respect does it suggest *Sialia*. Even a casual examination is sufficient to show that *Grandala* has, as Oates long ago concluded,[3] nothing to do with *Sialia*. In fact it does not belong in the same family, nor, indeed, to any other currently recognized family of passeriform birds, and it forms, consequently, a very distinct monotypic group, which should stand as

Grandalidae, fam. nov.

Diagnosis: Similar to the *Turdidae*, but bill motacilline, not turdine, slender; tip of maxilla not hooked; basal portion of culmen straight or

[1] Journ. Asiatic Soc. Bengal 12: 447. June, 1843.
[2] Cat. Birds Brit. Mus. 5: 328. 1881.
[3] Fauna Brit. Ind., Birds 2: 110. 1890.

even slightly concave, with only the tip noticeably decurved (instead of being convex and more or less decurved from base); gonys short, not longer than the exposed portion of the mandibular rami (instead of longer, as in the *Turdidae*), posteriorly not reaching to the anterior end of the nostrils, and not ascending, but, with the mandibular rami, forming a straight line; nostrils entirely exposed; wings very long and pointed, when closed reaching nearly to the end of the tail; secondaries relatively very short, much as in the *Hirundinidae*, their tips falling short of the tip of the longest primary by nearly one-half of the total length of the closed wing (instead of less than one-third in the *Turdidae*); second primary, counting from the outermost, usually longest but always at least equal to the third.

General characters: Bill rather short (about one-half the length of the head), slender, somewhat depressed basally, but somewhat compressed distally, in general aspect motacilline rather than turdine, its lateral outline nearly straight, the culmen straight or slightly concave, near its tip noticeably decurved; tip of maxilla not hooked; gonys short, not longer than the exposed portion of mandibular rami, and posteriorly not reaching to the anterior end of the nostrils, not ascending but continuing in a straight line from the mandibular rami; terminal portion of maxillar tomium slightly notched; nostrils fusiform or lengthened elliptical, entirely exposed, the feathers of the forehead reaching to their posterior end; narial and rictal bristles short and weak; wings very long and pointed, when closed reaching nearly to the end of the tail; wing tip long, the secondaries relatively very short, the tip of the longest primary exceeding them by nearly one-half (more than two-fifths) of the total length of the closed wing; tertials short, about the length of the longest secondaries; first (outermost) primary very short, about 15 mm. in length; second primary usually longest; third primary equal to the second or slightly shorter; fourth primary decidedly shorter than the third; and all the others regularly decreasing in length; none of the primaries sinuated on their inner webs, but the third and fourth primaries distinctly sinuated on their outer webs, and the fifth slightly so; tail of 12 feathers, about three-fifths of the length of the wing, deeply emarginate, the feathers moderately broad and stiff, their ends obtusely pointed; upper tail-coverts rather long; tarsi moderately long and slender, their length about $2^1/_5$ times the length of the exposed culmen; acrotarsium entire; toes moderately long and slender; claws of moderate length and curvature; claw of hallux not lengthened; length of middle toe without claw three-fifths of the length of the tarsus; plumage of male more or less metallic; coloration of sexes different; and young streaked.

Type genus: *Grandala* Hodgson.

Remarks: It is rather surprising that the genus *Grandala* has not before been taken out of the *Turdidae*, since its aberrance is so apparent. In only two important characters—its booted tarsi and streaked young

—does it resemble the *Turdidae*. It is, so far as we recall, the only passerine bird, excepting members of the *Hirundinidae*, that has such a remarkably long wing tip, which is produced by its relatively short secondaries. By this and its other external proportions, it is one of the most distinctively characterized of the families of *Passeriformes*. In some respects, particularly those of its bill and booted tarsus, it recalls some of the *Sylviidae*, and also some of the *Brachypterygidae*, as Oates has already suggested,[4] but from the latter family it differs in its relatively short gonys (compared with the length of the exposed part of the mandibular rami), less turdine shape of the bill, relatively short tarsi, long second and third primaries (beginning from the outermost) relatively short first primary, long wings, and long wing tip. It is, moreover, probably more nearly related to the *Turdidae* than to the *Brachypterygidae*, though not closely to either. Nor is it in any sense intermediate, since it differs in many of the same respects from both these families. It might be considered a highly specialized offshoot from the turdine stem, although the determination of its exact affinities must await the examination of its anatomy, which we confidently predict will serve to emphasize still more strongly its external peculiarities.

The only species in this new family is *Grandala coelicolor* Hodgson.

[4] Fauna Brit. Ind., Birds 2: 110. 1890.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

BOTANY.—*The Cactaceae, descriptions and illustrations of plants of the Cactus Family.* N. L. BRITTON and J. N. ROSE. Carnegie Institution of Washington, Publication No. 248, Vol. I. Pp. 236, pl. 36, figs. 302. June 21, 1919.

This work is the result of a long study by the authors based on extensive field observations and greenhouse and herbarium studies. The investigation has been chiefly financed by the Carnegie Institution of Washington, in cooperation with the New York Botanical Garden and the United States National Museum, while the United States Department of Agriculture has taken care of the living collections brought together in Washington.

The *Cacti* as here treated consist of a single order, *Cactales*, and of a single family, the *Cactaceae*; they are divided into three tribes, *Pereskieae*, *Opuntieae*, and *Cereeae*. This volume contains the treatment of the first tribes. The third tribe is to be treated in subsequent volumes.

The tribe *Pereskieae* contains the single genus, *Pereskia*, in which 19 species are described. The second tribe, *Opuntieae*, contains 7 genera, *Tacinga* and *Grusonia*, each with a single species, *Pterocactus* with 4, *Maihuenia* with 5, *Nopalea* with 8, *Pereskiopsis* with 10, and *Opuntia* with 264, grouped into 3 subgenera and 46 series.

The genera and species are described in detail and full synonymy is given. One new genus, *Tacinga* and 42 new species are described. All of the genera have been illustrated and of the 312 species, 267 are represented by one or more illustrations. The illustrations consist of 36 plates of which 28 are in color, 3 are half-tones, and 5 are heliotypes. The text-figures, 302 in number, consist of half-tones and zinc etchings.

J. N. R.

ENGINEERING.—*The compressive strength of large brick piers.* J. G. BRAGG. Bur. Stand. Tech. Paper No. 111. Pp. 39. 1918.

The purpose of this investigation was to determine the strength developed by brick piers of normal size as used in modern buildings, using in their construction such materials and grades of workmanship as are available in the United States.

The variables considered in the investigation are: (1) The quality of bricks employed with respect to grade and geographical location; (2) the quality and kind of mortar; (3) the grade of workmanship employed; and (4) the bonding of courses or method of laying the bricks.

The investigation comprises tests on 46 piers 30 in. × 30 in. × 10 feet in height, also 4 piers of the same cross sectional dimensions 5 feet in height. The bricks used in their construction are representative of four widely separated districts east of the Mississippi river and are classified according to the following 3 grades: (1) Hard burned or best quality; (2) medium burned or considered as common; (3) soft burned or poorest product marketed. Three mortars were used in the beginning and three grades of bond and workmanship were employed throughout the investigation. J. G. B.

ORNITHOLOGY.—*The migration of North American birds, V. The shrikes.* HARRY C. OBERHOLSER. Bird Lore 20: 286–290. 1918.

The tables of migration dates for *Lanius borealis* show the daily progress of its migration both in spring and autumn between the northern and southern limits of its range, including the average earliest dates of spring arrival for localities in its breeding area and the average and latest dates of its occurrence in places throughout its winter range; and in autumn the average and latest dates of the last one observed in its breeding area and of the first one noted in the localities in its winter range. Similar data are given for *Lanius ludovicianus* and its subspecies, the geographic distribution of each one of which is also outlined. H. C. O.

ORNITHOLOGY.—*The subspecies of* Larus hyperboreus *Gunnerus.* HARRY C. OBERHOLSER. Auk 35: 467–474. 1918.

No subspecies of *Larus hyperboreus* have hitherto been formally recognized, but recent investigation has resulted in the reinstatement of *Larus barrovianus* Ridgway as a readily separable race, differing

chiefly in its smaller size and decidedly darker mantle. The range of *Larus hyperboreus hyperboreus* extends over northern Asia, most of Europe, and northeastern North America, while *Larus hyperboreus barrovianus* occurs in western North America. H. C. O.

ORNITHOLOGY.—*Food habits of the mallard ducks of the United States.* W. L. McAtee. U. S. Dept. Agr. Bull. **720:** 1–36. 1918.

This bulletin contains the results of investigations on the food and food habits of *Anas platyrhyncha*, *Anas rubripes*, and *Anas fulvigula*, three closely allied and important game birds of the United States. Of *Anas platyrhyncha*, which has furnished most of the breeds of domestic ducks, examination of 1725 stomachs, taken at all seasons in 22 states of the United States and in 2 Canadian provinces, formed the basis of the author's conclusions. The vegetable elements comprise nine-tenths of the food of this species, and consist principally of sedges, grasses, smartweeds, pondweeds, duckweeds, coontail, wild celery, and various other water plants. Of some, such as *Zizania aquatica*, chiefly the seeds are eaten, but of many others also the stems, leaves, root-stocks, buds, and tubers are used. Other miscellaneous vegetable items, such as seeds of trees like *Planera aquatica* and of shrubs like *Celtis*, together with some acorns, are taken. The animal food of the mallard, which is only about one-tenth of the whole, is made up chiefly of insects and mollusks.

An interesting fact in connection with the stomach examinations of this species is the large number of individual items which sometimes are present. In a single stomach taken in Louisiana there were found 75,200 seeds of various water plants, and in another taken in the same State, 102,400 seeds of *Jussiaea leptocarpa*.

Of *Anas rubripes*, including its subspecies *Anas rubripes tristis*, 622 stomachs were examined, chiefly from the United States. In these the vegetable food made up 76 per cent of the contents, and consisted chiefly of pond-weeds, grasses, sedges, and smartweeds, together with many other less important items. The animal food, which was 24 per cent of the whole, was mostly mollusks, crustaceans, and insects.

The Florida duck, *Anas fulvigula*, including its subspecies *Anas fulvigula maculosa*, lives on vegetable food, mostly grasses, smartweeds, sedges, water lilies, pondweeds, and other water plants, to the extent of 60 per cent of its total food; and on animal diet, mostly mollusks, insects, and crustaceans, to the extent of 40 per cent.

Two long tables at the end of this bulletin show the items of vegetable food identified in the stomachs of all three species examined, and the number of stomachs in which each item was found. H. C. O.

ORNITHOLOGY.—*On the anatomy of* Nyctibius *with notes on allied birds.* ALEXANDER WETMORE. Proc. U. S. Nat. Mus. **54:** 577–586. 1918.

An examination of the trunk and visceral anatomy of *Nyctibius griseus abbotti* furnishes some interesting results. It confirms Mr. Ridgway's suborder *Nycticoraciae*, to include the superfamilies *Caprimulgi*, *Podargi*, and *Steatornithes*.

Owing, however, to the close relationship of the *Podargi* and *Caprimulgi*, they are here regarded as best included in a single superfamily, so that the suborder *Nycticoraciae* as here outlined would be divided into two superfamilies, the *Steatornithoideae*, containing a single genus *Steatornis*, and the *Caprimulgoideae*, containing the families *Podargidae*, *Nyctibiidae*, *Aegothelidae*, and *Caprimulgidae*.

Among other things, attention might be called particularly to the forms of the tongues in this suborder, as there are four general types representative of the *Podargidae*, *Nyctibiidae*, *Steatornithidae*, and *Caprimulgidae*. HARRY C. OBERHOLSER.

ORNITHOLOGY.—*Description of a new Iole from the Anamba Islands.* HARRY C. OBERHOLSER. Proc. Biol. Soc. Washington **31:** 197–198. December, 1918.

A specimen of *Iole olivacea* from the Anamba Islands in the South China Sea adds this species to their fauna, making altogether 57 species and subspecies of birds now known from this archipelago. It proves to be an undescribed race, and will stand as *Iole olivacea crypta*. It differs very markedly from *Iole olivacea charlottae* of Borneo, but appears to be the same as the bird from Sumatra. H. C. O.

ORNITHOLOGY.—*How to attract birds in the East Central States.* W. L. MCATEE. U. S. Dept. Agr. Farmers' Bull. **912:** 1–15. 1918.

The means of increasing the numbers of birds about the home and elsewhere consist chiefly in methods of protection and provision for nesting places, food, and water. Where feasible the most effectual protection is a vermin-proof fence. Breeding places may be readily furnished by boxes put up for the use of the birds, and water supplied

for drinking and bathing by fountains and open pools. It is most important, however, to provide food. This can be done artificially, particularly in winter, by feeding boxes and similar devices, but the most permanent and practical plan is to plant various seed and fruit producing trees and shrubs. Among the latter, alders, birches, larches, pines, junipers, bayberries, hollies, and similar trees are among the most satisfactory. The trees bearing fruits attractive to birds are here tabulated in a manner to show graphically the duration of the fruit season; and those that are desirable to plant as a protection to cultivated varieties which might be molested by the birds are separately indicated.

HARRY C. OBERHOLSER.

ORNITHOLOGY.—*The migration of North American birds. IV. The Waxwings and Phainopepla.* HARRY C. OBERHOLSER. Bird Lore **20**: 219–222. 1918.

This paper contains tables of migration dates for both spring and fall from localities in the United States, Canada, and Alaska, illustrating the migratory movements of *Bombycilla garrula*, *Bombycilla cedrorum*, and *Phainopepla nitens*. All of these species, *Bombycilla cedrorum* particularly, are more or less irregular and erratic in their movements.

H. C. O.

ORNITHOLOGY.—*The status of the genus* Orchilus *Cabanis.* HARRY C. OBERHOLSER. Proc. Biol. Soc. Washington **31**: 203–204. Dec. 30, 1918.

The generic name *Orchilus* Cabanis, proposed for a genus of South American *Tyrannidae*, has commonly had assigned for its type *Platyrhynchus auricularis* Vieillot. Its type is, however, really *Orchilus pileatus Cabanis*, which, since furthermore it is preoccupied by *Orchilus* Morris, makes it a synonym of *Lophotriccus* Berlepsch. This leaves the present genus *Orchilus* without a name, because *Perissotriccus* Oberholser, proposed for *Orchilus ecaudatus* Lafresnaye, is generically distinct from the other species commonly referred to *Orchilus*. This being the case, the new generic name *Notorchilus* is here proposed, with *Platyrhynchus auricularis* Vieillot for its type. H. C. O.

ORNITHOLOGY.—*Three new subspecies of* Passerella iliaca. H. S. SWARTH. Proc. Biol. Soc. Washington **31**: 161–163. December 30, 1918.

A recent study of *Passerella iliaca* and its subspecies, besides indicating

the distinctness of the recently described *Passerella iliaca brevicauda* Mailliard, has revealed the existence of three undescribed subspecies. These are *Passerella iliaca mariposae* from Chinquapin, Yosemite Park, California; *Passerella iliaca fulva* from Sugar Hill, Warner Mountains, Modoc County, California; and *Passerella iliaca canescens* from Wyman Creek, east slope of White Mountains, Inyo County, California.

HARRY C. OBERHOLSER.

ORNITHOLOGY.—*Washington region.* [December 1917, and January 1918.] HARRY C. OBERHOLSER. Bird Lore **20**: 164–165. 1918.

Notwithstanding one of the severest winters in local annals, there were few of the more northern winter birds about Washington during December 1917, and January 1918. Many of the smaller birds were very irregularly distributed and some of them not as numerous as usual. Hawks of various species were uncommonly numerous close to the city limits. A considerable increase was also noted in *Colinus virginianus* and *Sturnus vulgaris*, both of which were seen in considerable flocks. A single *Plectrophenax nivalis* noted on December 19, 1917, and a single *Lanius borealis* on December 28, are the most notable occurrences. Ducks of various species frequented the Potomac throughout the season in much greater numbers than usual. H. C. O.

ORNITHOLOGY.—*Two new genera and eight new birds from Celebes.* J. H. RILEY. Proc. Biol. Soc. Washington **31**: 155-159. December 30, 1918.

The zoological explorations of Mr. H. C. Raven in the island of Celebes, principally in the northern and middle portions, have resulted in the gathering of a large collection of mammals and birds. In the preliminary identification of the birds, six new species and two subspecies have been discovered, two of the distinct species belonging to new genera. These two new genera are *Coracornis*, a shrike-like bird allied to *Pachycephala* Vigors and Horsfield, of which the type is *Coracornis raveni;* and *Celebesia*, an interesting flycatcher allied to *Malindangia* Mearns, the type of which is the new species *Celebesia abbotti*. The other new species are *Rhamphococcyx centralis*, *Lophozosterops striaticeps*, *Catapenera abditiva* and *Cryptolopha nesophila*. The two new subspecies are an interesting new form of edible swiftlet, *Collocalia vestita aenigma*, and *Caprimulgus affinis propinquus*. HARRY C. OBERHOLSER.

GEOLOGY.—*A geologic reconnaissance of the Inyo Range and the eastern slope of the southern Sierra Nevada, California.* ADOLPH KNOPF. With a section on the stratigraphy of the Inyo Range. EDWIN KIRK. U. S. Geol. Survey Prof. Paper 110. Pp. 130, pls. 23, figs. 8. 1918.

The region described in this report comprises Owens Valley, in eastern California, and the portions of the Inyo Range and the Sierra Nevada between which it lies. The sedimentary rocks of the Inyo Mountains are more than 36,000 feet thick and range in age from pre-Cambrian to Triassic. The Silurian is the only Paleozoic system not represented. The Lower Cambrian of this area is not only notable for its great thickness (10,200 feet), but it contains the oldest Cambrian deposits known on the continent.

Early in Cretaceous time great masses of granitic rocks were intruded, both in the Inyo Range and the Sierra Nevada. The escarpment of the Sierra is composed dominantly of such rocks. Quartz monzonite predominates, and is represented by two varieties—a normally granular quartz monzonite and a porphyritic variety holding large orthoclase crystals, which makes up the summit region of the range. Younger than these is a coarse white alaskite (an orthoclase—albite granite), which occurs in large masses in this part of the Sierra. Notable features of the geology of the region are the great alluvial cones that extend out from the flanks of both ranges into Owens Valley; the two epochs of glaciation recognizable in the moraines in the canyons of the east slope of the Sierra; and the group of basaltic cinder cones on the alluvial slope between Big Pine and Independence, some of which stand on fault lines marked by fresh alluvial scarps.

The region is rich in mineral resources—silver, lead, zinc, tungsten, gold, and marble—and the waters of Owens Lake yield soda and other chemicals. The mines at Cerro Gordo in the Inyo Range have produced more silver-lead ore than any other mine in California. In 1913 large bodies of tungsten ore were discovered in the Tungsten Hills west of Bishop. The ore consists of scheelite associated with garnet, epidote, quartz, and calcite, and is of contact-metamorphic origin. The ore bodies are important additions to the number of recognized contact-metamorphic scheelite deposits, a class of deposits that previously had hardly been suspected as a possible source of tungsten.

A. K.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE BOTANICAL SOCIETY OF WASHINGTON

The 135th regular meeting of the Society was held in the Assembly Hall of the Cosmos Club at 8.00 p.m., Tuesday, April 1, 1919; 65 members and 5 guests being present.

Under "Brief Notes and Reviews of Literature," Prof. A. S. HITCHCOCK exhibited a volume on "A Monographic Study of the Hawaiian Species of the Tribe Lobelioideae," by Prof. Joseph F. Rock. Mr. WALTER T. SWINGLE announced that, while he was in China, he purchased for the Library of Congress a large collection of Chinese books, mostly on natural history.

In a paper on *A poisonous milkweed, Asclepias galioides*, Dr. C. DWIGHT MARSH gave briefly a history of the loss of sheep in Colorado caused by the eating of the whorled milkweed. He stated that this plant had never been definitely recognized as having a toxic character, but careful feeding experiments demonstrated that it is exceedingly poisonous, not only to sheep, but to cattle and horses. A study of the distribution and habits of the plant shows that the problem of control is one of peculiar difficulty, for in certain irrigated regions, particularly in Colorado, this species is spreading with great rapidity.

Dr. C. H. KAUFMAN gave a paper on *The genus Cortinarius*, in which he described some of the typical species of the group. The lantern slides that were used were very instructive on the color and form of these brown-spored agarics. He stated that the genus contained over 500 species, of which 200 species have been recognized in the United States. They occur most abundantly in the temperate and colder zones, or in the higher altitudes, being found abundantly northward to the limits of forests and at elevations to the edge of the timber-line. Some species are intimately connected with roots of forest trees, and individual species are limited to special kinds of forests. They develop late in the season, preferring as a rule, the cooler months. Many of these species are highly colored and, as far as known, all are edible.

A joint paper on *A physiological study of Pythium debaryanum Hesse on the potato tuber* was given by Drs. LON A. HAWKINS and RODNEY B. HARVEY, in which it was shown that there is a correlation between the resistance of the tissue of the potato to puncture and the resistance to infection by the fungus. The paper was illustrated by motion photomicrographs showing the penetration of the cell walls of the potato by the fungus.

An animated cartoon on *The black stem rust and the barberry*, by Mr. G. D. GEORGE, was shown and explained by Dr. H. B. HUMPHREY. The life story of this rust was shown on the film. The story begins with the winter spores on stubble and wild grass and shows a spore germinating, the sporidia blowing to the barberry bush, the formation of cluster-cups on the barberry leaf, the blowing of a spore to the wheat leaf, its germination and the entrance of the mycelium, through a breathing pore, it branching and spreading within the leaf, and the production and dispersion of the red or summer spores, and their escape through the ruptured epidermis to infect other wheat plants.

A motion picture showing the opening of the flower of the night-blooming cereus was contributed by Mr. H. PITTIER. A two-reel film on *Citrus fumigation* prepared as an educational film by the U. S. Department of Agriculture, was also projected.

The program was followed by a social hour with refreshments.

CHAS. E. CHAMBLISS, *Recording Secretary.*

THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

The 322nd meeting of the Society was held May 1, 1919, in the Assembly Hall of the Cosmos Club. Vice-President WALTON presided and there were present 16 members and 1 visitor.

PROGRAM

A. B. GAHAN: *The black grain-stem sawfly of Europe in the United States.* This paper dealt with *Trachelus tabidus* (Fab.), the establishment of which in the United States has recently been discovered. This insect may become a serious pest of small grain, especially wheat, in this country. Some of the points discussed were the distribution both in the United States and in the old world, character of injury, description of adult and larva and comparison with related species, suggestions for control, and bibliography. The illustrations consisted of drawings of the adult, the larva of this and two allied species of similar habit, and a map of the distribution in the United States. The paper is to be published by the Department of Agriculture.

In the discussion of Mr. Gahan's paper Mr. WALTON stated that Mr. McConnell of the Bureau of Entomology has discovered in Pennsylvania a parasite that killed as high as 30 per cent of the sawfly larvae. Dr. QUAINTANCE remarked that this appears to be one of the few cases in which the necessary measures for insect control conflict with good agricultural practice, the rotation of wheat and clover being undoubtedly good agricultural practice and also favoring reproduction of the insect. Mr. Walton took exception to this, stating that forage experts claim better clover can be raised on plowed ground; but planting on stubble is easier and cheaper. Mr. ROHWER stated that sawflies are sluggish fliers, and was of the opinion that if in the rotation the fields to be

planted to grain were far apart the infestation would be considerably reduced. Mr. GAHAN thought that the fact that the species is already widely distributed in both mountain and plains regions indicates considerable ability to spread. Mr. WALTON suggested wind as a means of spreading. Mr. ROHWER stated it as his experience that sawflies seek shelter in high winds, and also that the species is perhaps more widely spread than outlined by Mr. Gahan, inasmuch as he has a larva from near Parkersburg, West Virginia, that is probably this species.

NOTES AND EXHIBITION OF SPECIMENS

Mr. SCHWARZ gave an account of a recent visit which he and several other entomologists had made to the Florida Everglades and keys. He described the topography and flora of the region especially contrasting the character of the everglades keys with the Florida keys. He spoke of the occurrence in semi-tropical Florida of the Coleopterous genus *Dendrosinus* (family Scolytidae). The type of this genus, *D. globosus* Eichoff, was described in 1868 from two specimens said to have come from "North America," but the correctness of this locality has always been doubted. However, during this visit to southern Florida, Mr. H. S. Barber discovered an undescribed species of this genus at Marathon (Key Vacas) boring in the solid wood of *Bourreria havaniensis*. This species differs greatly from *globosus*, and the other species of the genus, and Mr. Schwarz presented a description of it for publication in the proceedings of the Society.

Mr. CUSHMAN discussed the larva of the spider parasite, *Polysphincta texana* Gresson, describing its method of maintaining its hold on its host.

Dr. BAKER expressed the opinion that *Neotoxoptera violae* Theo., described from Egypt, is an aberrant form of *Rhopalosiphum violae* Pergande of America since similar forms are obtainable from Pergandes species in greenhouses here. Mr. ROHWER thought that the fact that a form of the American species resembling the African form can be produced in the greenhouse was no proof that the American and African forms are the same species. He objected to the synonymizing of the two until further proof of their identity is obtained. In support of his contention he cited the case of the so-called *Cladius pectinicornis*, one of the rose sawflies, stating that the American form, which has heretofore been considered as the same as the European species, is specifically distinct. Mr. HEINRICH agreed with Mr. Rohwer, stating that in the Microlepidoptera, American species that have formerly been considered the same as European species are rapidly being found distinct, and the European names are being taken out of American literature.

The 323rd regular meeting of the Society was held June 5, 1919, in the Assembly Hall of the Cosmos Club. President SASSCER presided and there were present 22 members and 6 visitors.

R. H. HUTCHINSON: *Experiments with steam disinfection in destroying lice in clothing.* Mr. Hutchinson prefaced his paper with some remarks about the louse, showing lantern slides, illustrating sexual characters, eggs, hatching, and the effect of steam on eggs. Further slides were then thrown on the screen showing field laundry units and a large delousing plant used at debarkation camps, the speaker explaining in detail all the different pieces of apparatus.

Major HARRY PLOTZ, U. S. Army, who was among the visitors, expressed his appreciation of the assistance furnished by Mr. Hutchinson, and told some of his experiences in connection with this work and in the war zone before the United States entered the war. Dr. BAKER was interested in the presence, mentioned by Mr. Hutchinson, of the peculiar yellow body in the nymphs of lice and the fact that it has not been recorded in the literature of the louse. A similar yellow body always occurs in several groups of Homoptera which he had studied. Its forerunner is present in the egg and is carried to the interior at the time of invagination. In parthenogenetic forms its history is tied up with the development of the ovaries. Buckner in a rather extensive paper on the subject has considered it a commensalistic organism. This view, however, is not held by all embryologists.

A. N. CAUDELL: *Notes on Zoraptera.* Mr. Caudell spoke of the biology and systematics of this peculiar order of insects. A point of particular interest was the finding of winged forms by Mr. H. S. Barber, and the fact that the insects have the habit of dealation.

G. C. CRAMPTON: *Phylogeny of Zoraptera.* This paper was presented by title by Mr. Caudell, who exhibited the drawings to be used as illustration in the published paper.

R. A. CUSHMAN, *Recording Secretary.*

BIOLOGICAL SOCIETY OF WASHINGTON

The 597th regular meeting of the Society was held in the Assembly Hall of the Cosmos Club, Saturday, May 3, 1919; called to order at 8.15 p.m. by Vice-President BAILEY; 30 persons present.

The following informal communications were presented:

A. WETMORE: Remarks on the feeding of purple finches on certain plant galls. The galls were the size of a finger-end and were held in the feet of the birds while being torn open.

L. O. HOWARD: Remarks on the soon-expected arrival of the adults of the seventeen-year locust and the desirability of securing more data on the chimney-building habits of the immature insect. In this connection EDITH R. KELEHER, WM. PALMER, and A. WETMORE reported their observations as to chimney building-habits.

R. W. SHUFELDT: Remarks on and exhibition of a second specimen of double-headed turtle and of a double-headed snake. Both speci-

mens had died in a very immature state. The snake had been identified as *Natrix sipedon*. In this connection E. W. NELSON referred to a double-headed snake observed by him.

The regular program consisted of two communications:

A. WETMORE: *Notes on the brown pelican.* The speaker gave an account of the life and habits of this bird as observed by him on Pelican Island, Florida, in the early part of the present year. His remarks were illustrated by numerous lantern slides. Discussion by E. W. NELSON, R. W. SHUFELDT, A. S. HITCHCOCK, L. O. HOWARD, and I. N. HOFFMAN.

VERNON BAILEY: *The explorations of Maximilian, Prince of Wied, on the Upper Missouri in 1833.* The speaker described the travels of this early naturalist and many of the animals encountered by him. His remarks were illustrated by lantern-slide views of many of these animals and by motion-picture views of many of the larger mammals of the Upper Missouri region. Discussion by R. W. SHUFELDT.

The 596th regular meeting of the Society was held in the Assembly Hall of the Cosmos Club, Saturday, April 19, 1919; called to order at 8 p.m. by Vice-President HOLLISTER; 43 persons were present.

On recommendation of the Council H. H. LANE, of Norman, Oklahoma, was elected to active membership.

Under the heading, "Book notices, brief notes, exhibition of specimens, etc.," the following informal communications were presented:

W. P. TAYLOR: A brief account of the organization of the American Society of Mammalogists on April 3 and 4, 1919.

T. S. PALMER: Remarks on ornithological activities in Germany during the war as revealed by a recently received ornithological journal published in that country for 1918. Ornithologists appeared to have been active in Germany in spite of the war but their fields of research were necessarily limited through lack of communication with the outside world, but bird problems in Germany, migration records in Germany, including rather complete migration records at Heligoland, and bibliographic matters, especially of African birds, received rather marked attention.

A. S. HITCHCOCK: Remarks on the organization of the National Research Council as pertaining to biology.

The regular program was as follows:

WALTER P. TAYLOR: *Notes on Dr. J. G. Cooper's scientific investigations on the Pacific Coast.* Dr. James Graham Cooper was one of the most active students of birds and mammals on the Pacific Coast in the middle nineteenth century. Born in New York June 19, 1830, he early became interested in the West through his connection with the Stevens Survey of the Pacific Railroad Route along the 47th and 49th parallels. He was most active as a field collecter between the years 1853 and 1866, during which period he worked for more than two years in Washington Territory and collected widely in California. He collected types or

cotypes of eight species of mammals; five specific names and one vernacular name were given in his honor; and he published formal descriptions of four birds, one mammal, and one reptile. His bird papers number twenty-six, his mammal papers thirteen. Before 1860 his interests were in general natural history, embracing botany and meteorology as well as zoology. Subsequent to that time he concentrated his attention on zoology, doing most of his work in conchology and ornithology. He died July 19, 1902, at Hayward, California.

Discussion by T. S. PALMER, A. S. HITCHCOCK, and L. W. BROWN.

C. W. FIELD: *Observations on the heath hen*, illustrated by lantern slides. Discussion by W. W. GRANT, L. O. HOWARD, R. M. LIBBEY.

ALBERT MANN: *Woods Hole diatoms*, illustrated by lantern slides. Discussion by A. S. HITCHCOCK, MRS. N. HOLLISTER.

The 598th regular meeting of the Society was held in the Assembly Hall of the Cosmos Club, Saturday, May 17, 1919; called to order at 8.30 p.m. by President SMITH; 45 persons present.

The following informal communications were presented:

W. R. MAXON: Exhibition of and remarks on a fungus of the genus *Mitromyces*.

W. R. MAXON: Inquiry as to whether both sexes of birds are known to sing. Discussion by H. C. OBERHOLSER and WM. PALMER, who cited instances in which the females of certain species of birds are known to sing.

F. V. COVILLE: Remarks on a vine in the Department of Agriculture having a length of 1134 feet. It was planted 12 years ago and by appropriate trimming can be made to grow 100 feet a year. It roots at intervals of its length so that water and salts are not drawn through its entire length. Discussion by A. S. HITCHCOCK and W. E. SAFFORD.

A. S. HITCHCOCK: Remarks on the state of publication of the soon-to-appear flora of the District of Columbia and vicinity.

I. N. HOFFMAN: Remarks on the recently reported occurrence of several flocks of whooping cranes in Texas.

WM. PALMER: Remarks on tide conditions of Chesapeake Bay as influenced by winds and storms and observation on the large numbers of dead croakers and of other fishes recently seen by him in the Bay in the vicinity of Chesapeake Beach. These fishes furnished an abundant food for crows and buzzards.

H. M. SMITH: Exhibition of and remarks on an exceedingly small (but not the smallest) species of fish, *Lucania ommata* from a small freshwater lake in Georgia.

The regular program consisted of two communications:

F. V. COVILLE: *The strange story of the box huckleberry.* (To be published in full in a forthcoming issue of *Science*.)

W. E. SAFFORD: *Plants used in the arts and industries of the ancient Americans.*

M. W. LYON, JR., *Recording Secretary.*

SCIENTIFIC NOTES AND NEWS

MATTERS OF SCIENTIFIC INTEREST IN THE SIXTY-SIXTH CONGRESS

In addition to the large supply bills, which provide for the work of the scientific bureaus of the Government, several measures have been introduced in the first session of the Sixty-sixth Congress which are of special interest to the scientific profession.

The three bills concerned with the tariff and the removal of the duty-free privilege on scientific supplies were published in the preceding number of this JOURNAL, together with a note on the hearings held on the bills.[1] Mr BACHARACH later combined the three bills into one (H. R. 7287) under the title: "A bill to provide revenue for the Government, to establish and maintain in the United States the manufacture of scientific instruments, laboratory apparatus, laboratory glassware, laboratory porcelain ware—an industry essential to national defense." On July 15 a hearing on "surgical instruments" was held before the House Ways and Means Committee, at which Col. C. R. DARNELL, of the Army Field Medical Supply Depot, and representatives of three manufacturers of surgical instruments testified. On July 24 Mr. Bacharach introduced a substitute bill, H. R. 7785, "To provide revenue for the Government, to establish and maintain in the United States the manufacture of laboratory glassware, laboratory porcelain ware, optical glass, scientific and surgical instruments," in which a paragraph was added placing a duty of 60 per cent on surgical and dental instruments. This bill was reported to the House without amendment, and recommended for passage, on July 26 (Report 157).

Federal aid to research is provided for in the following bills:

S. 16 (Mr. SMITH of Georgia): "To establish engineering experiment stations in the States and Territories, in connection with institutions of higher technical education, for the promotion of engineering and industrial research as a measure of industrial, commercial, military, and naval progress and preparedness in times of peace or war." Referred to the Committee on Education and Labor.

S. 105 (MR. GRONNA): "For the promotion of engineering and industrial research." To the Committee on Agriculture and Forestry.

H. R. 1108 (MR. RAKER): "To make accessible to all the people the valuable scientific and other research work conducted by the United States through establishment of a national school of correspondence." To the Committee on Education.

S. 15 and S. 1017 (Mr. SMITH of Georgia), H. R. 7 (Mr. TOWNER), and H. R. 2023 (Mr. RAKER) provide for the creation of a federal Department of Education.

[1] See this JOURNAL 9: 389. 1919.

Special provisions regarding research in the federal bureaus are contained in the following bills and resolutions:

S. 814 (Mr. OWEN): "To establish a department of health and for other purposes." To the Committee on Public Health and National Quarantine.

S. 2380 (Mr. SMOOT): "To provide for an increased annual appropriation for agricultural experiment stations, to be used in researches and experiments in home economics, and regulating the expenditure thereof." To the Committee on Agriculture and Forestry.

S. 2507 (Mr. FRANCE): "To establish an executive department to be known as the Department of Public Health, and for other purposes." To the Committee on Public Health and National Quarantine.

S. 2635 (Mr. FLETCHER): "To authorize the Department of Commerce, by the National Bureau of Standards, to examine and test manufactured articles or products for the owner or manufacturer thereof, to issue a certificate as to the nature and quality of such manufactured articles or products, and to prevent the illegal use of such certificate." To the Committee on Commerce.

H. R. 3736 (Mr. FREAR): "To transfer the Public Health Service from the Department of the Treasury to the Department of the Interior." To the Committee on Interstate and Foreign Commerce.

H. Concurrent Res. 12 (Mr. VAILE, by request): "Requiring a scientific study of values and relative values by the Bureau of Standards." To the Committee on Coinage, Weights, and Measures.

Attempts to relieve the admittedly desperate situation of the Patent Office are contained in H. R. 5011, H. R. 5012, H. R. 6913, and H. R. 7010. These provide for making the Patent Office a separate department of the Government, and for increasing the salaries and personnel. Hearings on these bills were begun before the Committee on Patents on July 9.

Several measures have been introduced to provide for research on the causes, prevention and treatment of the still obscure disease, commonly called influenza, which was epidemic in the United States in the latter half of 1918. These measures include: S. Joint Res. 76 (Mr. HARDING), H. R. 7293 (Mr. BLACK), H. R. 7700 (Mr. LARSEN), H. R. 7778 (Mr. FESS), and H. Joint Res. 159 (Mr. EMERSON). Mr. MYERS has introduced S. 1258, "To prohibit experiments upon living dogs in the District of Columbia or in any of the Territorial or insular possessions of the United States, and providing a penalty for violation thereof." Referred to the Committee on the Judiciary.

At the request of the Engineering Council Mr. JONES of Washington introduced S. 2232, and Mr. REAVIS, H. R. 6649, "To create a Department of Public Works and define its powers and duties." These bills provide for the assembling of all the engineering activities of the Government in one department. The Department of Public Works would replace the present Department of the Interior, and such bureaus

of the latter as are nonengineering in character would be transferred to other departments. The new department would include the following existing organizations: Supervising Architect's Office, Construction Division of the Army, several engineering commissions now under the War Department, Bureau of Standards, Coast and Geodetic Survey, Bureau of Public Roads, and Forest Service. Referred to the Committee on Public Lands.

On July 22 the House passed H. R. 6810, the "Prohibition Bill," introduced by Mr. VOLSTEAD: "To prohibit intoxicating beverages and to regulate the manufacture, production, use and sale of high-proof spirits for other than beverage purposes, and to insure an ample supply of alcohol, and promote its use in scientific research and in the development of fuel, dye, and other lawful industries." One of the amendments accepted on July 21 just before the final passage of the bill was as follows: "That alcohol may be withdrawn, under regulations, from any industrial plant or bonded warehouse, tax free for the use of the United States or any governmental agency thereof, for the several States and Territories, and the District of Columbia, and for the use of any scientific university or college of learning, any laboratory for use exclusively in scientific research, or any hospital not conducted for profit."

Of local interest are S. 2537 (Mr. FRANCE) and H. R. 6237 (Mr. LAZARO, by request): "To revive with amendments an act entitled, 'An act to incorporate the Medical Society of the District of Columbia.'" Referred to the Committees on the District of Columbia.

THE PUBLIC BUILDINGS COMMISSION AND THE SCIENTIFIC BUREAUS

The space available for the Geological Survey, the Bureau of Mines, and other scientific and technologic branches of the Interior Department has been considerably reduced by the action of the Public Buildings Commission, according to the report of that Commission made to the Senate on July 8. Re-allotments of space have also been made in the Departments of Agriculture, Commerce, Navy, Treasury, and War, as well as in the various special war organizations. The apparent saving to the Government from the vacating of rented buildings is estimated at about $350,000. The Geological Survey is restricted to about one-half the floor space it now occupies. Realizing that the work of the Survey cannot be properly done under such conditions and some classes of work cannot be done at all, the scientific and technical force of the Survey have protested this action in the following letter:

"To the Chairman, Joint Commission to assign space in public buildings:

"The undersigned, geologists, engineers, chemists, and other scientific and technical members of the staff of the United States Geological Survey, earnestly protest against the recent action of the Public Build-

ings Commission which will result in reducing the space allotted to the scientific, technical and clerical employees of the Geological Survey in the New Interior Building to 75 square feet per person, or about one-half that now occupied.

"It is beyond argument that the industrial, social, and economic advancement of a nation is largely measured by its capacity to encourage scientific researches and apply their results. The Federal and State governments have recognized this fact by establishing scientific and technical bureaus to aid in the development of the country's resources and the administration of the laws.

"The proper housing of a scientific and technical bureau such as the Geological Survey demands adequate consideration of freedom from interruption, proper lighting and ventilation, and easy access to numerous reference books, drafting tables, valuable maps in various stages of completion, specimens of many materials, and considerable special equipment.

"The Geological Survey in carrying out the work assigned to it by Congress has been able to perform highly useful public service, to draw to its staff men of the highest professional training and ideals, and to create standards of workmanship and efficiency that are well known and widely approved.

"After 30 years of service the Geological Survey found itself housed under crowded and unsanitary conditions that hindered its efficiency, menaced the standards of its work, and sufficiently endangered the health of its employees to call forth a protest from the Public Health Service. At that time the average floor space available to clerical employees was about 64 square feet and to scientific and technical employees about 102 square feet. These conditions led to the preparation of plans for a building especially adapted to the Geological Survey's needs and in 1913 to the passage of the bill authorizing the construction of the New Interior Building, of which the Survey now occupies about one-third.

"The present personnel of the Geological Survey in Washington includes about 320 geologists, engineers, chemists, and other scientific and technical employees, about 260 clerical employees, and 121 skilled mechanics and workmen. By the proposed reduction in allotted space the first two groups, aggregating 580 employees, must carry out their official work in 44000 square feet of floor space, or about 20 per cent less than that occupied by a similar corps of workers in the old crowded and unsanitary quarters.

"Careful investigation gives convincing evidence that an average of at least 150 square feet, or twice that allotted by the Public Buildings Commission, is the minimum within which the employees of the Geological Survey can perform their official duties with proper regard for efficiency and standards of work.

"It is stated that the reduction in allotted space is made in the in-

terest of economy. The members of the Geological Survey are entirely willing to bear their due share of any burdens imposed by a program of national economy, but they protest that the proposed reduction in floor space and the resulting crowding will not be an economy but will actually cause a loss in efficiency exceeding the saving.

"We respectfully request that the Public Buildings Commission reconsider the allottment of space as it affects the Geological Survey."

NOTES

Messrs. H. A. EDSON and W. W. STOCKBERGER, of the Bureau of Plant Industry; W. I. SWANTON, of the Reclamation Service; C. O. JOHNS, of the Bureau of Chemistry; J. F. MEYER, of the Bureau of Standards; O. S. ADAM, of the Coast and Geodetic Survey; and SIDNEY F. SMITH of the Patent Office are assisting the Congressional Joint Reclassification Commission in the classification of the employees in the Federal scientific bureaus.

The Bureau of Mines is to be divided into an Investigations Branch and an Operations Branch, each with an assistant director in charge. Under the Investigations Branch will come mineral technology, fuels, mining, petroleum, and experiment stations. Under the Operations Branch will be a chief clerk, a division of education and information, the mine rescue work, and the Government fuel yards.

Dr. C. G. ABBOT, of the Smithsonian Institution, reports successful observations of the solar eclipse on June 5 at La Paz, Bolivia.

Dr. SAMUEL AVERY, formerly major in the Chemical Warfare Service in Washington, has returned to the University of Nebraska.

Miss ELEANOR F. BLISS, of the Geological Survey, and Miss A. F. JONAS are spending three months surveying the crystalline rock area of northeastern Maryland for the Maryland Geological Survey, correlating the Maryland classification and map units with those recognized by these geologists and Miss FLORENCE BASCOM, in adjacent portions of Pennsylvania.

Dr. WILLIAM BOWIE, chief of the Division of Geodesy of the Coast and Geodetic Survey, received the honorary degree of Doctor of Science from Trinity College, Hartford, Connecticut, on June 23.

Mr. STEPHEN C. BROWN, registrar of the National Museum for over forty years, died on July 11, 1919.

Mr. W. A. ENGLISH, formerly a geologist of the Geological Survey and now engaged in professional work in the oil and gas fields of California, has returned temporarily to Washington to complete a report for the Survey.

Mr. SAMUEL W. EPSTEIN, formerly in charge of the rubber laboratory of the Bureau of Standards at Akron, Ohio, has been transferred to Washington and placed in charge of chemical rubber investigations at the Bureau.

Mr. J. G. FAIRCHILD has been reinstated as assistant chemist in the Geological Survey after seven years of chemical work in other government bureaus and for private interests. During part of this time he studied explosives for the arsenal at Dover, N. J., and more recently nitrous gas problems for the Bureau of Soils.

Mr. R. L. FARIS, Assistant Superintendent of the Coast and Geodetic Survey, has been nominated by the President as a civilian member of the Mississippi River Commission, to succeed the late HOMER P. RITTER.

Dr. J. WALTER FEWKES, chief of the Bureau of American Ethnology, left for the Mesa Verde in July to continue his work in the archeological development of the Park.

Mr. GERARD FOWKE, who has been conducting archeological field work for the Bureau of American Ethnology in Missouri, has recently sent to the National Museum a large collection of specimens from the Miller Cave, Pulaski County, the largest and most significant collection yet obtained from a Missouri cave.

Dr. WALTER HOUGH has recently returned from the White Mountain Apache Reservation, Arizona, where he conducted explorations for the Bureau of American Ethnology in a group of large ruins west of Cibecue.

Mr. HOYT S. GALE, of the Geological Survey, who has spent several months investigating the potash resources of Europe for the Department of the Interior, has made a study of the deposits of Alsace and of Spain, and will study those of Stassfurt, Germany, before returning to the United States.

Capt. HERBERT C. GRAVES, hydrographer in charge of coastal surveys of the Coast and Geodetic Survey, died suddenly in London on July 26 at the age of forty-nine. He had been abroad since June 12 as a representative of the United States at the International Hydrographic Conference, and was also one of the delegates from the American Section of the proposed International Geophysical Union, which met in Brussels in July. He was the Secretary of the Washington Society of Engineers.

Dr. E. C. HARDER has again taken up his work in the iron and steel section of the Geological Survey, after spending four months on leave of absence in geological investigations in Brazil for commercial interests.

Mr. J. N. B. HEWITT, ethnologist of the Bureau of American Ethnology, returned to Washington in July, after extended field studies among the Onondaga near Syracuse, New York, and the Mohawk, Aaynga, and Onondaga on the Grand River Grant near Brantford, Ontario.

Mr. J. C. HOSTETTER has resigned from the Geophysical Laboratory of the Carnegie Institution, to take up research and development work for the Steuben Glass Works, of Corning, New York.

Mr. F. B. LANEY, who was detailed in 1913 to the Bureau of Mines for cooperative research on complex and refractory ores, has returned to the Geological Survey where he will continue his research work on the metalliferous ores. After five years at the Colorado, California, Utah, and Pittsburgh stations of the Bureau of Mines, he took charge of a government metallographic laboratory at Pittsburgh where he cooperated with the Ordnance Department of the Army during 1918 and 1919 in the microscopic examination of metals and alloys used in the manufacture of ordnance.

Dr. WILLIS T. LEE has returned to the Geological Survey after six months' leave of absence, during which he was head of the department of geology and director of the School of Engineering Geology of the University of Oklahoma.

Wesleyan University at its recent commencement conferred the degree of Doctor of Science on Dr. F. B. LITTELL, astronomer of the Naval Observatory.

Mr. E. RUSSELL LLOYD resigned on July 12 as geologist in charge of petroleum resources in the Division of Mineral Resources of the Geological Survey. He is now geologist for the Ohio Cities Gas Company.

Mr. FRANCOIS E. MATTHES, of the Geological Survey, gave a series of lectures in Yosemite National Park during the month of July, under the auspices of the university extension division of the University of California. The subjects were as follows: July 8: *Origin of the Yosemite Valley, as indicated in the history of its waterfalls.* July 9: *The highest ice flood in the Yosemite Valley.* July 12: *The origin of the granite domes of Yosemite.*

Mr. CARL W. MITMAN has been appointed Curator of the Division of Mechanical Technology in the Smithsonian Institution.

Mr. C. H. OBER of the Coast and Geodetic Survey has been granted leave of absence to go with Dr. ALEXANDER RICE'S expedition to the Amazon River.

Mr. SIDNEY PAIGE has resumed his duties at the Geological Survey after six months' leave of absence spent in professional work in the northern part of South America.

Mr. JOHN L. RIDGWAY, chief of the section of illustrations of the Geological Survey, has returned from a month's leave of absence spent in a trip to the Pacific Coast.

Dr. CHARLES C. SCALIONE, formerly a lieutenant in the Research Division of the Chemical Warfare Service, has been appointed assistant catalytical chemist in the Fixed Nitrogen Research Laboratory of the Nitrate Division, Ordnance Department, at the American University.

Dr. H. L. SHANTZ, of the Bureau of Plant Industry, has been appointed botanist with the expedition to South and Central Africa which sailed from New York in July under the direction of Mr. EDMUND

HELLER, of the American Museum of Natural History. Mr. RAVEN, of the Smithsonian Institution, accompanied the expedition as naturalist in charge of zoological and anthropological collections. The expedition will proceed from Cape Town to Victoria Falls, cross into the Belgian Kongo, and then travel east to Lake Tanganyika, and will be abroad for at least one year.

Mr. R. L. V. STRATTON, who enlisted from the Geological Survey to serve as paymaster in the Navy during the war and was stationed at the Virgin Islands for about eighteen months assisting the new American government of the islands in various capacities, has joined with RALPH W. RICHARDS, formerly a geologist of the Survey, in an engineering firm with offices in Washington. They will specialize on the evaluation of oil and gas properties and the determination of income taxes on such properties.

Dr. J. B. UMPLEBY, of the Geological Survey, has returned from Paris, having been temporarily under the State Department assisting the American delegation at the peace conference in mining matters.

Dr. T. WAYLAND VAUGHAN, Mr. D. DALE CONDIT, and Dr. C. WYTHE COOKE, of the Geological Survey, have returned to Washington after spending several months in a geologic reconnaissance of the Dominican Republic for the Dominican Government. Mr. C. P. Ross, who was also a member of the party, has remained a few weeks longer to make special examinations of the water resources in the vicinity of Samaná Bay. Dr. Vaughan also visited Port-au-Prince, Haiti, and made arrangements with the Haitian Government for a preliminary geological survey of Haiti. At the request of the Navy Department he later made geologic reconnaissances at various other points in the West Indies.

Mr. C. M. WEBER, of Balabac, Philippine Islands, has donated to the National Museum an unusually fine series of Philippine land shells, including new forms.

Dr. R. C. WELLS, of the Geological Survey, has returned from a visit to the Marine Laboratory of the Carnegie Institution of Washington at Tortugas, Florida, where he made a number of chemical determinations on water collected directly from the sea.

Mr. DEAN E. WINCHESTER has returned to the Geological Survey after a month's absence, during which he was engaged in a search for mineral fuels on the island of Jamaica for private interests.

Mr. ROBERT H. WOOD has returned to professional work in the oil and gas fields of Oklahoma, after spending several months in Washington completing reports left unfinished when he left the Geological Survey a year ago.

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